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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HUGHES, SCOTT A

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/806,009	Applicant(s) GASTON ET AL.	
	Examiner Scott A. Hughes	Art Unit 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
 4a) Of the above claim(s) 12-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-11, drawn to a method for acquiring seismic data while drilling a well, classified in class 367, subclass 27.
- II. Claims 12-19, drawn to a system comprising a surface source, and a seismic receiver installed in a drill string and comprising a sensor, classified in class 367, subclass 25.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used in another process. The apparatus has the intended use of being a system for acquiring seismic data while drilling a well. However, the system as claimed of a surface source, a seismic receiver in a drillstring, and a seismic sensor on the receiver could be used in measurement while tripping systems or in could be used when the wellbore is not being drilled to image underground formations.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Kaushik P. Sriram on 6/21/2005 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-11. Affirmation of this election must be made by applicant in replying to this Office action. Claims 12-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 8 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2 and 8 recite the limitation "the surface processor." There is insufficient antecedent basis for this limitation in the claim because there is not mention of a surface processor in claim 1, from which claims 2 and 8 depend.

Claim 9 recites the limitation "the surface detected signals." There is insufficient antecedent basis for this limitation in the claim because there is no mention of surface detected signals in claim 1, from which claim 9 depends.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Robbins.

With regard to claim 1, Robbins discloses a method for acquiring seismic data while drilling a well (Column 2, Lines 19-37). Robbins discloses conveying at least one seismic receiver 150 installed in a drill string 120 (Fig. 1) (Column 2, Line 57-67; Column 3, Lines 7-25). Robbins discloses generating coded seismic signals by a seismic source 170 at a surface location, and detecting the coded seismic signals with at least one sensor in the at least one seismic receiver at at least one location in the wellbore (Column 3, Lines 10-20, Column 3, Line 45 to Column 4, Line 7)). Robbins discloses computing an arrival time for the detected seismic signals in the seismic receiver (Column 3, Line 59 to Column 4, Line 7). Robbins discloses that the seismic source generates signals at a certain frequency (Column 3, Lines 50-55), and this frequency is read as the coded signal.

With regard to claim 2, Robbins discloses that the computed arrival time is transferred to a surface processor (Column 3, Line 65 to Column 4, Line 5).

With regard to claim 3, Robbins discloses that the computed arrival time is stored in the seismic receiver (Column 6, Lines 37-43).

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With regard to claim 4, Robbins discloses that the coded seismic signals further comprise timed discrete events (Column 3, Lines 14-25; Column 4, Line 60 to Column 5, Line 38) (Figs. 4,8).

With regard to claim 5, Robbins discloses that the coded signals comprise timed discrete frequencies (Column 3, Lines 14-25; Column 4, Line 60 to Column 5, Line 38) (Figs. 4,8).

With regard to claim 6, Robbins discloses a plurality of receivers located along the drill string (Fig. 1) (Column 4, Lines 60-68).

With regard to claim 10, Robbins discloses a method for acquiring seismic data while drilling a well (Column 2, Lines 19-37). Robbins discloses conveying at least one seismic receiver 150 installed in a drill string 120 (Fig. 1) (Column 3, Lines 7-25). Robbins discloses generating coded seismic signals by a seismic source 170 at a surface location, and detecting the coded seismic signals with at least one sensor in the at least one seismic receiver at at least one location in the wellbore (Column 3, Lines 10-20, Column 3, Line 45 to Column 4, Line 7)). Robbins discloses computing, in the seismic receiver, a check shot transit time for the detected seismic signals, and transferring the check shot transit time to the surface (abstract; Column 3, Line 59 to Column 4, Line 8).

Claims 1-2, 4-5, and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Eaton.

With regard to claim 1, Eaton discloses a method for acquiring seismic data while drilling a well. Eaton discloses conveying at least one seismic receiver 14 installed in a drill string 11 (Fig. 1). Eaton discloses generating coded seismic signals 18, 19, 27 by a seismic source 16,25 at a surface location 17, and detecting the coded seismic signals with at least one sensor 14 in the at least one seismic receiver at at least one location in the wellbore. Eaton discloses computing an arrival time for the detected seismic signals in the seismic receiver (abstract, [0004]-[0011]).

With regard to claim 2, Eaton discloses that the computed arrival time is transferred to a surface processor ([0030]-[0032]).

With regard to claim 4, Eaton discloses that the coded seismic signals further comprise timed discrete events ([0029]; [0033]-[0034]).

With regard to claim 5, Eaton discloses that the coded signals comprise timed discrete frequencies ([0029]; [0033]-[0034]).

With regard to claim 10, Eaton discloses a method for acquiring seismic data while drilling a well. Eaton discloses conveying at least one seismic receiver 14 installed in a drill string 11 (Fig. 1). Eaton discloses generating coded seismic signals 18, 19, 27 by a seismic source 16,25 at a surface location 17, and detecting the coded seismic signals with at least one sensor 14 in the at least one seismic receiver at at least one location in the wellbore. Eaton discloses computing, in the seismic receiver, a check shot transit time for the detected seismic signals, and transferring the check shot transit time to the surface (abstract; [0004]-[0011]).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7-9, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Cecconi.

With regard to claim 1, Cecconi discloses a method for acquiring seismic data while drilling a well (Column 1, Lines 1-10). Cecconi discloses conveying at least one seismic receiver 12 installed in a drill string 5 (Fig. 1a). Cecconi discloses generating coded seismic signals by a seismic source 6 at a surface location 7, and detecting the coded seismic signals with at least one sensor 18 in the at least one seismic receiver 12 at at least one location in the wellbore (Column 3, Lines 40-65). Cecconi discloses computing an arrival time for the detected seismic signals in the seismic receiver (Column 1, Lines 12-17; Column 3, Lines 50-63).

With regard to claim 2, Cecconi discloses that the computed arrival time is transferred to a surface processor (Columns 9 and 10).

With regard to claim 3, Cecconi discloses that the computed arrival time is stored in the seismic receiver (Columns 9 and 10).

With regard to claim 4, Cecconi discloses that the coded seismic signals further comprise timed discrete events (Column 10, Lines 25-35).

With regard to claim 7, Cecconi discloses detecting the seismic signals with at least one sensor 8 located at the surface and storing the signal detected by the surface sensor in a surface processor (Column 3, Lines 29-45).

With regard to claim 8, Cecconi discloses transferring the signals stored in the seismic receiver to a surface processor upon removal of the drill string from the wellbore (Columns 9 and 10).

With regard to claim 9, Cecconi discloses processing, according to programmed instructions, the surface detected signals and the seismic receiver detected signals to generate a seismic map (Column 1, Lines 1-20; Column 4, Lines 28-65).

With regard to claim 11, Cecconi discloses a method for acquiring seismic data while operating a drill string in a wellbore (Column 1, Lines 1-10). Cecconi discloses synchronizing, at the surface, a surface clock 48 in a surface controller 10 with a downhole clock 23 in a seismic receiver 12 (Figs. 1a, 3) (Column 4, Lines 52-65; Column 8, Lines 15-36; Columns 6-10 in general). Cecconi discloses programming, at the surface, a processor in the seismic receiver to activate during at least one predetermined time window after a predetermined delay time (Column 8, Lines 37-50). Cecconi discloses that the receiver is programmed beforehand, meaning that is programmed before being used in the well and therefore it is programmed at the surface. Cecconi discloses conveying the seismic receiver in the drill string to a location of interest in the wellbore (Column 8, Lines 37-50; Column 1, Lines 1-30) (Fig. 1a). Cecconi discloses generating, under control of a surface processor, coded seismic signals by a seismic source 6 near a surface location (Fig. 1a) (Column 3, Lines 29-40;

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Column 10, Lines 27-34). Cecconi discloses a control module attached to the seismic source, and states that the source transmits waves that are detected by the sensors. These transmitted waves are a form of coded signal. Cecconi discloses detecting the seismic source signals with a near-source sensor 8 and storing the signals in the surface processor 9 (Column 3, Lines 29-65). Cecconi discloses detecting the seismic signals with at least one sensor in the seismic receiver 12 at a location of interest 13 in the wellbore (Column 3, Lines 41-64). Cecconi discloses storing the seismic signals in the receiver and transferring the detected seismic signals from the seismic receiver to the surface processor (Columns 9 and 10). Cecconi discloses processing the near-source signals and the seismic receiver detected signals according to programmed instructions to generate a seismic map (Column 1, Lines 1-20; Column 4, Lines 28-65).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Robbins in view of Cecconi.

With regard to claim 7, Robbins does not disclose detecting the seismic signals with at least one sensor located at the surface and storing the signal detected by the

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surface sensor in a surface processor. Robbins discloses using synchronized surface and downhole receiver clocks to determine the arrival and check shot times of the generated seismic waves (Columns 3-4). Robbins discloses that a trigger detection system monitors the time at which the source is fired in order to obtain the start time for the transmission of the seismic waves (Column 4, Lines 1-15). Cecconi discloses a system similar to that of Robbins in which a surface source and a receiver located in a drill string are used along with synchronized clocks to gain information about underground formations by recording seismic waves generated at the surface. Cecconi discloses using a surface sensor 8 (Fig. 1a) to determine the travel times (Fig. 2) (Column 3). It would have been obvious to modify Robbins to use a surface reference sensor as disclosed by Cecconi instead of the trigger detection system (or as the trigger detection system) in order to determine when the seismic source is activated and to determine the beginning of the travel time interval for the seismic waves.

Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cecconi in view of Robbins.

With regard to claim 5, Cecconi does not disclose that the coded signals comprise timed discrete frequencies. Robbins discloses transmitting signals at a specific frequency (Column 3) in order to be able to detect when seismic waves generated by the source arrive at the sensor. It would have been obvious to modify Cecconi to generate waves with the vibrator source (Column 4, Lines 25-35) at a certain

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discrete frequency so that the arrival of the signals can be detected over the background noise based on their frequency.

With regard to claim 10, Cecconi discloses a method for acquiring seismic data while drilling a well (Column 1, Lines 1-10). Cecconi discloses conveying at least one seismic receiver 12 installed in a drill string 5 (Fig. 1a). Cecconi discloses generating coded seismic signals by a seismic source 6 at a surface location 7, and detecting the coded seismic signals with at least one sensor 18 in the at least one seismic receiver 12 at at least one location in the wellbore (Column 3, Lines 40-65). Cecconi does not disclose computing, in the seismic receiver, a check shot transit time for the detected seismic signals, and transferring the check shot transit time to the surface. Cecconi discloses computing the time (Δt) that it takes for the direct path wave to go from the source to the receiver in the borehole. Cecconi discloses taking these measurements every 10m, which is a known depth increment. It is known a check shot is made with a known depth increment and with the time it takes for a direct path signal to travel from the source to the receiver (See Robbins Columns 3-4). Therefore, Cecconi discloses a method that can be used to take check shot data by using the transit times and the known depth increments of the receiver.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kan, who discloses obtaining check shots with a surface source and receivers in a wellbore.

Collins, who discloses a logging while drilling system.

Haldorsen, who discloses an MWD system.


Leaney, who discloses a time-picking step for a borehole receiver using a surface source.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


SAH


JACK KEITH
PRIMARY EXAMINER
SPE 3663